AgriHealth: Journal of Agri-food, Nutrition and Public Health. 6(2), 158-168, 2025
URL: https://jurnal.uns.ac.id/agrihealth/article/view/108442
DOI: http://dx.doi.org/10.20961/agrihealth.v6i2.108442
ISSN 2722-0656 (Print) 2722-0648 (Online)

Parental Perceptions of Deworming vis-à-vis Children's Activity Level, Appetite, and Eating Patterns as Indicators of Nutritional Well-being in the Municipality of Buug, Zamboanga Sibugay, Philippines

Breathny A. Cabahug[1], Cherrgie Mae B. Caong[1], Reynald M. Hisona[1], Robelyn A. Saga[1], Tashmera D. Laranjo[1], Christy L. Taruc[1], Maricel L. Tercio[1] and Randy Ian F. Gallego[2*]

[1]Department of Nursing, College of Arts and Sciences, Mindanao State University–Buug Campus, Buug, Philippines; [2]College of Health Sciences, Mindanao State University–Main Campus, Marawi City, Philippines

Received: August 26, 2025; **Accepted**: October 24, 2025

Abstract

Intestinal parasitic infections remain a persistent public health problem in low-resource settings, contributing significantly to childhood malnutrition. Deworming programs have been recognized as an effective strategy to enhance nutrient absorption, promote child growth, and improve overall health. However, parental perceptions influence the uptake and success of these interventions. This study aimed to assess parents' perceptions of the role of deworming in controlling malnutrition among school-aged children. A descriptive-correlational design was employed among 104 parents or guardians of school-aged children enrolled in two public elementary schools in Buug, Zamboanga Sibugay, Philippines, who were recipients of local and national deworming programs. Data were collected using a validity- and reliability-tested questionnaire (CVR = 0.5 to 0.9; Cronbach's alpha = 0.75) and analyzed using frequency, percentage, standard deviation, and correlation analyses, including Spearman's rho and Pearson's r. At a 0.05 level of significance, improvement in children's activity levels was very significantly associated with parental sex ($p = 0.007$) and employment status ($p = 0.003$). Improvement in children's appetite and eating patterns was significantly related to parental employment status ($p = 0.006$) and number of children in the household ($p = 0.021$). These findings highlight how sociodemographic factors influence parental perceptions of deworming outcomes, underscoring the need for targeted education and community awareness initiatives to enhance the acceptance and effectiveness of deworming programs as a public health strategy for combating malnutrition.

Keywords: child health; nutritional status; parasitic infection; public health intervention; school health programs

INTRODUCTION

Intestinal parasitic infections, particularly soil-transmitted helminths (STHs), remain a substantial global health challenge, disproportionately affecting children in low- and middle-income countries. A recent global assessment estimated that approximately 1.5 billion people were infected with STHs in 2021, resulting in roughly 1.38 million disability-adjusted life years (DALYs), with school-age children bearing the most significant burden (Chen et al., 2024). These infections impair nutrient absorption, cause anemia, hinder

* **Corresponding author**: randyian.gallego@msumain.edu.ph

Cite this as: Cabahug, B. A., Caong, C. M. B., Hisona, R. M., Saga, R. A., Laranjo, T. D., Taruc, C. L., Tercio, M. L., & Gallego, R. I. F. (2025). Parental Perceptions of Deworming vis-à-vis Children's Activity Level, Appetite, and Eating Patterns as Indicators of Nutritional Well-being in the Municipality of Buug, Zamboanga Sibugay, Philippines. *AgriHealth: Journal of Agri-food, Nutrition and Public Health*, *6*(2), 158-168. doi: http://dx.doi.org/10.20961/agrihealth.v6i2.108442

cognitive development, and ultimately compromise children's growth and learning potential (Pabalan et al., 2018; Degarege et al., 2022).

In the Philippines, STHs continue to threaten child health despite ongoing control efforts. Although nationwide statistics from the early 2000s are limited, baseline surveys conducted before the launch of the Integrated Helminth Control Program revealed strikingly high infection rates. Approximately 66% of preschool-age children and 54% of school-aged children (6 to 12 years old) were infected with STHs (Mationg et al., 2021). In response, the country's Department of Health (DOH) and Department of Education (DepEd) have implemented mass deworming initiatives, primarily through school-based mass drug administration (MDA), to curb STH transmission (Lorenzo et al., 2019). These campaigns rely on preventive chemotherapy using albendazole or mebendazole and target all children aged 12 months to 12 years (Soares Magalhães et al., 2015).

Parents, as primary caregivers, play a crucial role as both observers and facilitators of children's post-deworming experiences. They often notice subtle indicators of improved well-being, such as changes in appetite, eating habits, and activity levels, which provide valuable insights into the intervention's impact (Gallego and Abdullah, 2021). However, while much research has focused on prevalence, intervention coverage, and biomedical outcomes, parental perceptions of deworming remain largely underexplored. This lack of focused inquiry is particularly evident in rural communities with limited health literacy and inadequate sanitation infrastructure, where parental perspectives are seldom documented, especially in rural Philippine settings with constrained access to health education and basic sanitation services.

Understanding this gap becomes even more critical when viewed within the broader context of public health. In many rural Philippine communities, poverty, inadequate sanitation, and limited access to healthcare converge to sustain persistently high rates of intestinal parasitic infections (Ross et al., 2017b; Labana et al., 2024). In Mindanao, the country's second-largest island, studies from provinces such as Agusan del Sur and Surigao del Norte demonstrate how poor living conditions and inadequate water, sanitation, and hygiene (WaSH) infrastructure perpetuate the heavy burden of intestinal helminthiases (Paller et al., 2024). Similarly, anecdotal accounts from health workers further highlight a spectrum of parental attitudes toward deworming, from strong endorsement to lingering skepticism, which significantly influences program uptake and sustainability.

While existing literature offers valuable insights into epidemiological trends and the efficacy of interventions, it provides a limited understanding of how parents in rural communities perceive, interpret, and respond to deworming initiatives. This lack of contextual knowledge represents a significant gap, particularly in areas where low health literacy, inadequate sanitation, and cultural beliefs intersect to shape health behaviors. Understanding these parental perceptions is therefore critical to designing context-sensitive strategies that enhance acceptance, strengthen adherence, and maximize the long-term impact of deworming interventions in marginalized settings.

Given these considerations, the present study was conducted to explore parental perceptions of deworming in relation to children's nutritional well-being. Specifically, it aimed to investigate how parents perceived changes in their children's appetite, eating patterns, and activity levels after deworming. By focusing on these parental observations, the study aimed to provide context-specific evidence that can inform more culturally sensitive and community-based strategies to enhance deworming program effectiveness in resource-limited rural settings.

MATERIALS AND METHOD

Study design

This study employed a descriptive–correlational research design to examine parents' perceptions of the role of deworming in controlling malnutrition among school-aged children. The research was conducted at Graciano Dormitorio Memorial Elementary School and Picanan Elementary School in the municipality of Buug, Zamboanga Sibugay, Philippines. These two schools were purposively chosen because they are among the largest public elementary schools in the municipality and consistent recipients of the Department of Education's deworming program, making them suitable sites for investigating parental perceptions in the context of school-based deworming.

Population and sample

The study population consisted of all parents or legal guardians of school-aged children enrolled in the selected schools who received the national deworming program during the data collection period. Inclusion criteria were: (a) being the father, mother, or legal guardian of a child who received deworming; (b) serving as the primary caregiver of the child; (c) being able to observe changes in the child's condition following deworming; and (d) providing informed consent to participate.

A total enumeration sampling strategy was employed, in which all eligible respondents were invited to participate in the study. Out of 114 eligible parents or guardians, 104 consented and were included in the study. Because the entire target population was considered, no separate sample size computation was required.

Study variable

The independent variables were the sociodemographic characteristics of the respondents, which included age, sex, civil status, educational attainment, monthly income, employment status, and number of children. The dependent variables were parental perceptions of changes in their children's nutritional well-being following deworming, specifically in terms of appetite, eating patterns, and activity levels.

Study instruments

Data for the study were gathered using a structured, researcher-developed questionnaire consisting of 20 items divided into 2 sections. The first section collected sociodemographic information from the respondents, while the second section assessed parental perceptions of the effectiveness of deworming in controlling malnutrition. A 3-point Likert scale (Always = 3, Sometimes = 2, Never = 1) was used to ensure simplicity and ease of comprehension, particularly for respondents in rural communities with varying literacy levels. This scale was chosen to minimize response confusion and encourage accurate reporting. Weighted means were computed and interpreted on a scale from 1.00 to 3.00.

The instrument's content and face validity were established through expert review by the research adviser, panel members, and a statistician specializing in community nursing. Construct validity was further supported through a literature review. Reliability testing yielded a Cronbach's alpha coefficient of 0.75, indicating acceptable internal consistency.

Data analysis

All responses were coded, tabulated, and analyzed using JASP version 0.16.4. Descriptive statistics (frequency, percentage, mean, and standard deviation) summarized sociodemographic characteristics and parental perceptions. Spearman's rho correlation was applied to determine the relationship between sociodemographic variables and perception scores, as the data were ordinal in nature. Statistical significance was set at a p-value of ≤ 0.05.

Research ethics

Ethical approval for the study was obtained from the Mindanao State University–Buug Research Ethics Committee. Informed consent was obtained from each respondent, and they were assured of their rights, including confidentiality, anonymity, and the option to participate voluntarily. All procedures adhered to institutional and ethical guidelines for research involving human participants.

RESULTS AND DISCUSSION

This section presents the data collected in tabular form. Similarly, tables and discussions are presented according to the following flow: frequency and percentage distribution of the sociodemographic profile of the respondents, and descriptive statistics on the role of deworming in controlling malnutrition as perceived by parents, focusing on improvements in the child's activity level, appetite, and eating pattern.

Based on Table 1, the respondents in this study were predominantly young to middle-aged adults, with the majority falling within the age brackets of 26 to 30 years and 36 to 40 years. This finding is significant because individuals in this stage of life are often active in both caregiving and income-generating responsibilities, allowing them to closely monitor their children's daily routines, appetite, and overall well-being after deworming. Experts assert that caregiver observations are crucial in recognizing early signs of illness in children and can even precede abnormal clinical indicators, highlighting the value of experienced caregivers in detecting subtle health changes after intervention (Weaver, 2025).

Table 1. Descriptive statistics of the frequency and percentage distribution of the sample according to the sociodemographic profile (n = 104)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years old)	20–25	6	5.77
	26–30	31	29.81
	31–35	16	15.38
	36–40	29	27.88
	41–45	10	9.62
	46–50	11	10.58
	61–65	1	0.96
Sex	Male	78	75.00
	Female	26	25.00
Civil status	Single	34	32.69
	Married	67	64.42
	Widow/er	3	2.89
Highest educational attainment	Elementary level	40	38.46
	Elementary graduate	3	2.88
	High school level	18	17.31
	High school graduate	27	25.96
	College level	16	15.39
Monthly income (PHP)	≤ 5,000 (≈ 86 USD)	40	38.46
	5,000–10,000 (≈87–172 USD)	52	50.00
	≥ 10,001 (≈173+ USD)	12	11.54
Employment status	Employed	9	8.65
	Unemployed	95	91.35
Number of children	1–5	81	77.88
	6–10	23	22.12

Interestingly, the majority of caregivers were male (75%), which is unusual in the context of Filipino households, where mothers traditionally take on the primary caregiving role (Modillas et al., 2024). This shift may signify evolving family dynamics in rural communities, where men increasingly participate in caregiving due to factors such as flexible employment arrangements, maternal outmigration, or adaptive role-sharing within the household. Recent research highlights that paternal involvement has a positive influence on children's health outcomes and adherence to treatment regimens (Fah, 2024). Moreover, active participation of fathers has been linked to enhanced cognitive and language development, as well as improved mental well-being among children (Allport et al., 2018).

In many families, fathers take the lead in bringing their children to medical appointments, ensuring financial support for treatment, and purchasing prescribed medications (Jeong et al., 2018). Their caregiving responsibilities often extend to supervising hygiene practices, preparing nutritious meals, and accompanying children during school-based health activities, which are contributions that promote greater compliance with preventive health measures such as deworming. Thus, the active participation of fathers identified in this study represents an untapped resource that can strengthen parental engagement in the program. By designing communication strategies that target both mothers and fathers, the national deworming initiatives can foster shared responsibility and improve compliance with deworming schedules.

Moreover, the educational attainment of respondents revealed that most had only reached the elementary level, with none having completed tertiary or vocational training. This suggests potential limitations in health literacy, which can affect how caregivers interpret and respond to health interventions such as deworming. Low educational attainment has been linked to a reduced understanding of medical guidance and follow-up care, making it essential for health workers to adapt their communication strategies to ensure parents comprehend post-deworming expectations (Ross et al., 2017a).

Most respondents belonged to low-income households, earning an average of 5,000 to 10,000 PHP per month (approximately 85 to 170 USD). This income level reflects economic vulnerability that may affect participation in child health initiatives. According to the World Bank (2025), the updated international poverty line is 3 USD per person per day, or about 90 USD per month; thus, many households in this study fall below or only slightly above the poverty threshold. Considering the typical family size in the Philippines, most families remain below the global poverty benchmark. Such financial constraints often limit families' ability to prioritize preventive health measures, such as deworming, as immediate needs take precedence. Poverty has long been identified as a key determinant of the persistence of intestinal helminth infections in the country, largely due to limited access to proper nutrition, clean water, and sanitation (Paller et al., 2024). Consequently, caregivers' capacity to sustain post-deworming care may remain limited despite the availability of free public health programs.

Finally, household size was relatively large, with most families having between 1 and 5 children, and nearly a quarter having 6 or more children. Larger family sizes may reduce the attention each child receives and increase the caregiving burden, potentially influencing the accuracy with which parents observe health-related changes in their children after deworming (Ross et al., 2017a). In essence, larger household sizes have the potential to dilute attention per child, thus adding to caregiving burdens and poorer surveillance of deworming outcomes.

The findings further reveal that parents perceived their children to be consistently active following deworming, as indicated by the grand mean of 2.383 (Table 2), which can be interpreted as "always." This suggests that the deworming intervention not only addressed parasitic infection but also appeared to improve overall activity and vitality as observed by caregivers. Increased engagement in regular physical activity, adequate nightly sleep, and sustained daily movement reflect positive health outcomes that align with evidence linking deworming to improved energy utilization and child functioning (WHO, 2023).

Interestingly, while children were reported to be socially active and adherent to self-care routines, their participation in structured sports activities was rated only as "sometimes." This may not necessarily reflect a lack of physical vigor. Still, in the rural context, where organized sports are less accessible, children's daily movement often occurs through informal play or household chores. Recent evidence from Brazil suggests that children in rural settings may spend less time engaging in organized sports and more time on chores or informal play (de Jesus et al., 2024). Additionally, qualitative research has

Table 2. Descriptive statistics of parental perceptions of children's activity levels in relation to deworming

	Mean	Std. Deviation	Interpretation
Been socially active with peers after deworming	2.740	0.462	Always
Slept during the afternoon after deworming	2.192	0.655	Sometimes
Slept for at least 8 hours at night after deworming	2.827	0.380	Always
Followed a self-care routine such as bathing, brushing teeth, and washing hair after deworming	2.692	0.541	Always
Engaged in regular physical activities after deworming	2.856	0.353	Always
Maintained an active level of daily movement after deworming	2.760	0.512	Always
Actively participated in sports such as basketball, volleyball, or badminton after deworming	2.144	0.864	Sometimes
Performed household chores such as washing plates and sweeping the floor after deworming	2.510	0.683	Always
Spent time sitting alone most of the day after deworming	1.394	0.645	Never
Slept for most of the day after deworming	1.712	0.678	Sometimes
Grand mean	2.383	0.577	Always

Note: Always = 2.31 to 3.00; Sometimes = 1.61 to 2.30; Never = 1.00 to 1.60

shown that children themselves perceive barriers to structured sports, such as limited space, time constraints, and lack of facilities, and often favor unstructured active play instead (Nally et al., 2022). Similarly, participation in household chores was noted as "always," though at a lower frequency than movement-related indicators, reflecting that children may prioritize play and rest over domestic responsibilities after deworming.

Notably, parents seldom observed negative behaviors, such as lethargy or social withdrawal, in their children, who rarely sat alone or slept excessively during the day. Such observations reinforce the perception that deworming programs may contribute to increased physical and social activity in children. Recent empirical research supports this: for example, a 2023 multilevel study in Tanzania found that deworming was significantly associated with improvements in children's nutritional status, suggesting enhanced functional health as a by-product of reduced parasitic burden (Moshi et al., 2023). Another study examining deworming paired with school meals after the COVID-19 pandemic highlighted that children in the treated cohort displayed greater school participation and informal peer activity compared to the control group (Karutu et al., 2022).

These results highlight that parents perceive deworming as having tangible benefits for children's daily activities, reinforcing the importance of sustained participation in both national and local deworming initiatives. Moreover, the findings assert the value of parental perspectives as a means of capturing subtle yet meaningful changes in children's health and behavior that might not be easily measured through clinical outcomes alone.

Parents observed notable improvements in their children's appetite and eating habits following deworming, as reflected by a grand mean of 2.208 (Table 3), which can be interpreted as "sometimes." Particularly high are the ratings for increased appetite, completing 3 full meals per day, looking forward to mealtimes, quick meal completion, and consuming anything served, suggesting a meaningful shift toward improved dietary engagement. Similar observations have been documented in recent studies, where dewormed children demonstrated enhanced nutritional status and general well-being, attributed to reduced parasitic load and improved nutrient absorption. These findings are consistent with broader evidence from large-scale analyses in Tanzania and India, which report positive associations between deworming and child health outcomes, including increased appetite, better growth, and improved micronutrient profiles (Moshi et al., 2023; Chakrabarti et al., 2024).

Conversely, negative behaviors such as refusing meals, loss of appetite, and a slower eating pace, despite increased food intake, were rarely observed among the children, reinforcing the idea that deworming supports the restoration of normal dietary behavior rather than

Table 3. Descriptive statistics of parental perceptions of children's appetite and eating patterns in relation to deworming

	Mean	Std. Deviation	Interpretation
Experienced an increase in appetite after deworming	2.769	0.467	Always
Eaten 3 full meals a day after deworming	2.904	0.327	Always
Looked forward to mealtimes after deworming	2.817	0.435	Always
Finished meals quickly after deworming	2.452	0.621	Always
Frequently asked for food after deworming	2.442	0.636	Always
Refused to eat meals after deworming	1.442	0.636	Never
Left food on the plate at the end of meals after deworming	1.654	0.679	Sometimes
Lost appetite during meals after deworming	1.394	0.630	Never
Eaten more food but at a slower pace during meals after deworming	1.490	0.697	Never
Eaten any food served at the table during mealtimes after deworming	2.712	0.534	Always
Grand mean	2.208	0.566	Sometimes

Note: Always = 2.31 to 3.00; Sometimes = 1.61 to 2.30; Never = 1.00 to 1.60

Table 4. Relationship between the sociodemographic profile of parents and their perceptions of children's activity level, appetite, and eating patterns post-deworming

Variable		Age	Sex	Civil status	Educational attainment	Monthly income	Employment status	Children number
Parental perception of the child's activity level	Spearman's rho	-0.121	0.263**	-0.138	-0.121	0.065	0.285**	0.145
	p-value	0.220	0.007	0.163	0.222	0.513	0.003	0.142
Parental perception of the child's appetite and eating patterns	Spearman's rho	-0.003	0.084	-0.041	-0.115	-0.035	0.267**	0.226*
	p-value	0.975	0.399	0.678	0.247	0.723	0.006	0.021

Note: *$p < 0.05$; **$p < 0.01$

disrupting it. Recent studies have shown that children who received deworming treatment exhibited improved nutritional status, including better appetite and dietary intake, in low-resource settings (Hermawan et al., 2023). The generally higher ratings for positive eating behaviors, coupled with low reports of adverse patterns, suggest that parents perceived some improvement in their children's gastrointestinal comfort and nutrient absorption after deworming.

The parents' observations align with clinical findings that deworming can have a positive effect on children's dietary engagement (Hamory et al., 2021; Moshi et al., 2023), an effect that may not always be captured through clinical or anthropometric measures alone. These insights highlight the importance of incorporating caregiver perspectives into the evaluation of deworming programs, particularly for monitoring subtle yet meaningful health improvements.

Table 4 presents the correlations between parents' sociodemographic characteristics and their perceptions of children's activity levels and appetite/eating patterns after deworming. For parental perception of children's activity level, significant positive correlations were observed with sex ($\rho = 0.263$, $p = 0.007$) and employment status ($\rho = 0.285$, $p = 0.003$), indicating that these variables were associated with perceived improvements in activity. No significant relationships were found with age, civil status, educational attainment, monthly income, or number of children. Regarding parental perception of children's appetite and eating patterns, significant positive correlations were noted with employment status ($\rho = 0.267$, $p = 0.006$) and number of children ($\rho = 0.226$, $p = 0.021$), while other sociodemographic factors showed no significant association.

The significant association between parental sex and perceptions of children's activity levels underscores how caregiving roles and observational patterns shape interpretations of post-deworming outcomes. Mothers, who typically assume primary caregiving responsibilities, may be more attentive to subtle changes in children's physical activity, while fathers may interpret improvements differently, reflecting gendered differences in parental monitoring (Uddin et al., 2021). These differences are further reinforced by gender norms, which influence not only how parents observe children's health but also how they engage with health

providers and make treatment-related decisions. As Morgan et al. (2016) emphasize, gender plays a critical role in shaping vulnerability to ill health, household decision-making, health-seeking behaviors, and service utilization. Thus, caregiver perspectives are informed by both biological realities and socially constructed expectations, which frame how health interventions, such as deworming, are perceived and evaluated within the household.

On the other hand, employment status emerged as a consistent predictor across both activity and appetite perceptions, suggesting that employed parents may be somewhat more likely to report positive outcomes following deworming. This pattern likely reflects how employed caregivers may have greater access to resources such as time, information, and financial means to reinforce and recognize post-treatment benefits. For example, children of employed mothers in northwest Ethiopia were found to have lower rates of under-nutrition compared with those of unemployed mothers (Zelalem et al., 2023). Moreover, parental health literacy, which is known to enhance responsiveness to child health needs, is strongly influenced by employment, education, and socio-economic status (Zaidman et al., 2023). Employed parents are often more connected to health education channels and tools that foster literacy and awareness of child health exigencies.

This finding, combined with evidence that many families live below the poverty line, underscores the importance of integrating deworming with broader nutrition and sanitation interventions. National guidelines already promote multisectoral collaboration among schools, health units, and community leaders; however, parental involvement remains essential for sustaining behavioral change. Policies that ensure parents receive timely information, clear reassurance regarding safety, and accessible channels for feedback can enhance trust and improve program effectiveness, particularly in rural settings.

Consequently, the number of children was positively correlated with parents' perceptions of improved appetite and eating patterns. One possible explanation is that parents from larger families may develop sharper observational skills through repeated caregiving. A study of nurses in China found that as the number of children increased, caregiving behaviors shifted from meticulous attention to more measured management, highlighting how caregiving dynamics evolve in multi-child households and influence how parental observations are interpreted (Huang et al., 2023). This accumulated experience may also enable caregivers to detect subtle differences in appetite and feeding behavior among their children more readily than parents with fewer children.

CONCLUSIONS

This study demonstrates that both biomedical effects and sociodemographic factors, including sex, employment status, and family size, influence parental perceptions of deworming outcomes. These shape caregiving roles, health literacy, and parents' ability to interpret changes in children's appetite and activity. Perceptions are thus socially constructed within household and community contexts rather than being entirely objective. Recognizing these influences, deworming programs should integrate social determinants into their design, fostering parental engagement, strengthening community trust, and improving the overall impact of child health interventions. However, the study's cross-sectional design, reliance on self-reported parental perceptions, and focus on a limited sample from two schools may constrain the generalizability of the findings. Future research could adopt longitudinal or mixed-methods approaches to examine behavioral and physiological outcomes over time, providing a more holistic understanding of how deworming interventions affect child well-being. Recognizing these contextual and methodological considerations, deworming programs should integrate social determinants into their design, foster sustained parental engagement, and strengthen community trust to enhance the long-term impact of child health initiatives.

ACKNOWLEDGEMENTS

The authors extend their sincere gratitude to Mr. Ulysses Almocera and Prof. Hope Merasol for their valuable expertise and constructive insights as members of the examination panel. Special thanks are also due to the administrators, teachers, and staff of Graciano Dormitorio Memorial Elementary School and Picanan Elementary School for their cooperation and support throughout the conduct of this study. The authors likewise acknowledge the parents

and guardians who participated in the research for generously sharing their time and perspectives.

REFERENCES

Allport, B. S., Johnson, S., Aqil, A., Labrique, A. B., Nelson, T., Kc, A., ... & Marcell, A. V. (2018). Promoting father involvement for child and family health. *Academic Pediatrics*, *18*(7), 746–753. https://doi.org/10.1016/j.acap.2018.03.011

Chakrabarti, S., Ajjampur, S. S., Waddington, H. S., Kishore, A., Nguyen, P. H., & Scott, S. (2024). Deworming and micronutrient status by community open defecation prevalence: An observational study using nationally representative data from India, 2016–2018. *PLoS Medicine*, *21*(5), e1004402. https://doi.org/10.1371/JOURNAL.PMED.1004402

Chen, J., Gong, Y., Chen, Q., Li, S., & Zhou, Y. (2024). Global burden of soil-transmitted helminth infections, 1990–2021. *Infectious Diseases of Poverty*, *13*(05), 68–77. https://doi.org/10.1186/S40249-024-01238-9

de Jesus, G. M., Dias, L. A., Barros, A. K. C., Araujo, L. D. M. D. S., & Schrann, M. M. F. (2024). Do girls wash dishes and boys play sports? Gender inequalities in physical activity and in the use of screen-based devices among schoolchildren from urban and rural areas in Brazil. *BMC Public Health*, *24*(1), 196. https://doi.org/10.1186/s12889-024-17672-1

Degarege, A., Erko, B., Negash, Y., & Animut, A. (2022). Intestinal helminth infection, anemia, undernutrition and academic performance among school children in northwestern Ethiopia. *Microorganisms*, *10*(7), 1353. https://doi.org/10.3390/microorganisms10071353

Fah, L. (2024). Impact of parental involvement on child health outcomes. *Journal of Nursing & Patient Care*, *9*, 2. Retrieved from https://www.scitechnol.com/peer-review/impact-of-parental-involvement-on-child-health-outcomes-e2yA.php?article_id=26186

Gallego, R. I. F., & Abdullah, A. M. (2021). Structured assessment, evaluation and monitoring parameters: Critical correlates to the perceived effectiveness of school-based deworming programs. *Malaysian Journal of Medical Research (MJMR)*, *5*(2), 22–28. https://doi.org/10.31674/mjmr.2021.v05i02.005

Hamory, J., Miguel, E., Walker, M., Kremer, M., & Baird, S. (2021). Twenty-year economic impacts of deworming. *Proceedings of the National Academy of Sciences*, *118*(14), e2023185118. https://doi.org/10.1073/pnas.2023185118

Hermawan, D., Kurniasari, D., Sandayanti, V., Sari, N., & Listyaningsih, E. (2023). Relationships of deworming drug consumption and animal protein intake with stunting. *Parasite Epidemiology and Control*, *23*, e00326. https://doi.org/10.1016/j.parepi.2023.e00326

Huang, L., Huang, X., Wang, J., Zhang, F., Fei, Y., Tang, J., & Wang, Y. (2023). Factors influencing parent-child relationships in Chinese nurses: A cross-sectional study. *BMC Nursing*, *22*(1), 261. https://doi.org/10.1186/s12912-023-01413-7

Jeong, J., Siyal, S., Fink, G., McCoy, D. C., & Yousafzai, A. K. (2018). "His mind will work better with both of us": A qualitative study on fathers' roles and coparenting of young children in rural Pakistan. *BMC Public Health*, *18*(1), 1274. https://doi.org/10.1186/s12889-018-6143-9

Karutu, C., Schultz, L., Waltz, J., Campbell, S. J., Kamara, K., Yotebieng, K., ... & Bundy, D. A. (2022). A coordinated response to the needs of the learner: How deworming and school meals together will contribute to the global recovery from the COVID-19 pandemic. *Frontiers in Tropical Diseases*, *3*, 998276. https://doi.org/10.3389/fitd.2022.998276

Labana, R. V., Borda, M. C. N. M., Campo, R. T. A., Ocampo, M. A. V., & Ocampo, M. A. (2024). The interplay between household risk perception of parasitic infections and water, sanitation, and hygiene (WASH) practices: Evidence from an urban poor community in the Philippines. *Cureus*, *16*(4), e57532. https://doi.org/10.7759/cureus.57532

Lorenzo, P. J., Manzanilla, D. R., Cortel, D. K., & Tangog, E. (2019). Community perceptions of mass drug administration for soil-transmitted helminthiasis and schistosomiasis in selected

schools in the Philippines. *Infectious Diseases of Poverty*, *8*(1), 87. https://doi.org/10.1186/s40249-019-0595-8

Mationg, M. L. S., Tallo, V. L., Williams, G. M., Gordon, C. A., Clements, A. C., McManus, D. P., & Gray, D. J. (2021). The control of soil-transmitted helminthiases in the Philippines: The story continues. *Infectious Diseases of Poverty*, *10*(1), 85. https://doi.org/10.1186/s40249-021-00870-z

Modillas, M. B., Oliva, D. L., Opada, L. L. M., & Gallego, R. I. (2024). Exploring the drivers of home births: Perspectives, risks, benefits, and policy implications in Zamboanga Sibugay, Philippines. *Journal of Maternal and Child Health*, *9*(3), 315–325. https://doi.org/10.26911/thejmch.2024.09.03.04

Morgan, R., George, A., Ssali, S., Hawkins, K., Molyneux, S., & Theobald, S. (2016). How to do (or not to do)… gender analysis in health systems research. *Health Policy and Planning*, *31*(8), 1069–1078. https://doi.org/10.1093/heapol/czw037

Moshi, C. C., Sebastian, P. J., Azizi, K. A., Killel, E., Mushumbusi, D. G., Meghji, W. P., ... & Kasankala, L. M. (2023). Effect of deworming on health outcomes among children aged 12–59 months in Tanzania: A multilevel mixed effects analysis. *Journal of Nutrition and Metabolism*, *2023*(1), 9529600. https://doi.org/10.1155/2023/9529600

Nally, S., Ridgers, N. D., Gallagher, A. M., Murphy, M. H., Salmon, J., & Carlin, A. (2022). "When you move you have fun": Perceived barriers, and facilitators of physical activity from a child's perspective. *Frontiers in Sports and Active Living*, *4*, 789259. https://doi.org/10.3389/fspor.2022.789259

Pabalan, N., Singian, E., Tabangay, L., Jarjanazi, H., Boivin, M. J., & Ezeamama, A. E. (2018). Soil-transmitted helminth infection, loss of education and cognitive impairment in school-aged children: A systematic review and meta-analysis. *PLoS Neglected Tropical Diseases*, *12*(1), e0005523. https://doi.org/10.1371/journal.pntd.0005523

Paller, V. G. V., Belizario Jr, V. Y., Ancog, R. C., Alonte, A. J. I., Jimenez, J. R. D., Corales, C. G., ... & Betson, M. (2024). Socio-economic risk factors for intestinal helminthiases in selected endemic communities in Mindanao, the Philippines: A cross-sectional study. *BMC Infectious Diseases*, *24*(1), 1012. https://doi.org/10.1186/s12879-024-09780-5

Ross, A. G., Olveda, R. M., McManus, D. P., Harn, D. A., Chy, D., Li, Y., ... & Ng, S. K. (2017a). Risk factors for human helminthiases in rural Philippines. *International Journal of Infectious Diseases*, *54*, 150–155. https://doi.org/10.1016/j.ijid.2016.09.025

Ross, A. G., Papier, K., Luceres-Catubig, R., Chau, T. N., Inobaya, M. T., & Ng, S. K. (2017b). Poverty, dietary intake, intestinal parasites, and nutritional status among school-age children in the rural Philippines. *Tropical Medicine and Infectious Disease*, *2*(4), 49. https://doi.org/10.3390/tropicalmed2040049

Soares Magalhães, R. J., Salamat, M. S., Leonardo, L., Gray, D. J., Carabin, H., Halton, K., ... & Clements, A. C. (2015). Mapping the risk of soil-transmitted helminthic infections in the Philippines. *PLoS Neglected Tropical Diseases*, *9*(9), e0003915. https://doi.org/10.1371/journal.pntd.0003915

Uddin, M. F., Molyneux, S., Muraya, K., Hossain, M. A., Islam, M. A., Shahid, A. S. M. S. B., ... & Chisti, M. J. (2021). Gender-related influences on adherence to advice and treatment-seeking guidance for infants and young children post-hospital discharge in Bangladesh. *International Journal for Equity in Health*, *20*(1), 64. https://doi.org/10.1186/s12939-021-01404-7

Weaver, M. (2025). *Parental intuition better at spotting child illness than vital signs, study finds*. The Guardian. Retrieved from https://www.theguardian.com/society/2025/may/30/parental-intuition-better-at-spotting-child-illness-than-vital-signs-study-finds-marthas-rule?utm_source=chatgpt.com

WHO. (2023). *Soil-transmitted helminth infections*. World Health Organization. Retrieved from https://www.who.int/news-room/fact-sheets/detail/soil-transmitted-helminth-infections

World Bank. (2025). *June 2025 update to global poverty lines*. Retrieved from https://www.worldbank.org/en/news/factsheet/2025/06/05/

june-2025-update-to-global-poverty-lines

Zaidman, E. A., Scott, K. M., Hahn, D., Bennett, P., & Caldwell, P. H. (2023). Impact of parental health literacy on the health outcomes of children with chronic disease globally: A systematic review. *Journal of Paediatrics and Child Health*, *59*(1), 12–31. https://doi.org/10.1111/jpc.16297

Zelalem, H., Demilew, Y. M., Dagne, S., & Dessie, A. M. (2023). Prevalence of under-nutrition and its associated factors among 6–23 months old children of employed and unemployed mothers in town kebeles of Dera district, northwest Ethiopia: A comparative cross-sectional study. *BMC Nutrition*, *9*(1), 59. https://doi.org/10.1186/s40795-023-00713-0